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1980 Massachusetts Assessment of Nutrition Knowledge/Attitudes

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SUMMARY REPORT

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1980 Massachusetts Assessment of Nutrition Knowledge/Attitudes

SUMMARY REPORT

Massachusetts Department of Education
Bureau of Nutrition Education and School Food Services

September, 1980

FOREWORD

Factors which influence student learning include not only classroom curricula but also health, attitudes, and school environment. In its statement on educational goals, the Board of Education asserted that the capacity of any individual to achieve well depends upon a healthy body, a sound mind, and a positive self-concept. Therefore, as the Board strives to improve the quality of education in the Commonwealth, it is important to assess all factors affecting the learning process.

Current studies indicate that the nutritional health of children can be directly related to their educational achievement. A child who is malnourished, or merely hungry due to missed meals, is listless, nervous, and disruptive; these factors adversely affect that child's ability to learn. Because learning progresses in stages, a hungry child, by not responding to early stimulation, becomes less able to benefit from later experiences. In addition, many medical problems have been linked to poor nutrition. Heart disease, commonly thought of as a disease of the elderly, has recently been identified in adolescents. It is important for Massachusetts educators to teach children to become healthy, "nutrition-wise" adults and parents.

For these reasons an assessment was conducted of the nutrition knowledge and attitudes of Massachusetts public school children in selected schools. The highlights of the assessment are presented in this Summary Report. These findings demonstrate the need for and interest in nutrition education by students and adults, and will provide direction for future nutrition education programs.

Anne H. McHugh, Chairperson
Massachusetts Board of Education

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CHAPTER I

INTRODUCTION

Overview

PURPOSE. During the 1979-80 school year, the Massachusetts Department of Education conducted an assessment of nutrition knowledge and attitudes of students in Grades 6 and 12. This program, administered through the Bureau of Nutrition Education and School Food Services, implemented the Department's commitment "to promote educational assessment" for the improvement of education in the Commonwealth regarding all factors which influence student learning. The goals of the assessment were to:

- provide useful and accurate information pertaining to the current extent of student knowledge and attitudes about nutrition in Massachusetts,
- ascertain the extent of nutrition education activities and services taking place in schools as well as the attitudes of school administrators, teachers, and food service personnel concerning these activities, and
- provide state-level decision-makers with baseline information to direct future educational policy and to gauge progress toward state goals for nutrition education.

The purpose of this report is to describe the activities related to these program components and the major outcomes of the assessment.

BACKGROUND. National Evaluation Systems, Inc., (NES) of Amherst, Massachusetts, under contract to the Massachusetts Department of Education (MDE), was responsible for coordinating the nutrition assessment program this year. Staff of both NES and MDE worked jointly on all aspects of the assessment program. Major program components included the development of the test instruments, administration of the tests to a sample of students across the state in Grades 6 and 12, analysis and interpretation of the data obtained in the statewide testing, and dissemination of the assessment results.

The Measurement Instruments

A Technical Assistance Committee (TAC) for the Nutrition Education and Training Program (NETP) provided leadership in the development of all assessment instruments. This Committee consisted of a dedicated group of nutritionists and educators from across the Commonwealth. Input was also solicited from nationally recognized leaders in the field.

THE TESTS. Staff of both MDE and NES worked in conjunction with the Technical Assistance Committee to develop two objective-referenced assessment instruments. The first step in the test development effort involved the definition of six broad Goal Statements applicable to test development at both grade levels. A list of the goals is presented on page 3. Next, learning objectives were developed to further refine the nutrition education concepts presented in the Goal Statements. Several objectives (and the associated test items) were selected to appear on both test forms, making cross-grade comparisons of student performance possible.

NES staff, working jointly with content experts throughout test development, then drafted pools of multiple-choice items to match each objective. Items were reviewed by the TAC, MDE, and national consultants. Revisions were suggested and incorporated, and an initial selection of items was made for each grade-level test. After a small field test of the test instruments, a final selection of test items was made. A total of 50 test items were selected for each of the sixth- and twelfth-grade instruments. Sixteen of the items on each test were identical.

STUDENT AND PERSONNEL QUESTIONNAIRES. A student questionnaire was developed to collect information about student nutrition attitudes as well as home and school variables that might bear a relationship to test performance. Twenty items, identical for both grade levels, were included in the questionnaire. Nine additional items, related to school course information, were included on the twelfth-grade questionnaire. Questionnaires were printed at the front of each test booklet and were administered to all participating students.

A personnel questionnaire was designed to collect information on the attitudes of school administrators, teachers, and food service personnel toward student nutrition and nutrition education. The personnel questionnaire was composed of 49 multiple-choice items. These questionnaires were administered to samples of personnel representing each target grade level.

GOALS: GRADES 6 AND 12

- | | | |
|------|-------------------------------|---|
| I. | FOOD AND
NUTRIENTS | The student will develop an awareness of the sources and functions of food and nutrients, particularly in relation to maintaining physical and mental health. |
| II. | EATING
HABITS/
PATTERNS | The student will develop an understanding of factors which influence eating, the effects of eating habits, and the importance of a balanced diet in relation to physical and mental health. |
| III. | UTILIZATION
OF
FOOD | The student will develop an understanding of how the body digests and utilizes nutrients from foods. |
| IV. | CONSUMER
SKILLS | The student will develop an awareness of the factors that influence food choice and the skills necessary to become an informed, intelligent consumer. |
| V. | FOOD
HANDLING | The student will develop an understanding of food production on all levels and the effects of processing on the nutritional value of food. |
| VI. | FOOD
ECOLOGY | The student will develop an awareness of national and world food problems and the role of technology and social sciences in nutrition and the world food supply. |

Sampling Design

PURPOSE. In order to increase the reliability of the data collected and to reduce the impact of statewide testing activities, a sampling approach to testing was adopted. Intact classes of students were selected for participation according to a sophisticated sampling procedure. The sampling procedure protected the anonymity of all students, schools, and school systems. Actual participation in the assessment activities was voluntary.

The fact that the participation of schools was voluntary has potential implications for the interpretation of the assessment results. If this voluntary self-selection were due to some systematic variable (such as average achievement level or extent of nutrition-related curriculum), the representativeness of the assessment sample might be questioned. However, there is no evidence to suggest that this was the case. Most principals who refused to participate cited other statewide testing and scheduling burdens which prevented them from taking part in the assessment.

The sample at each age level was designed to be representative of students from schools in each of four kinds of communities. All students of the appropriate age level were eligible for participation except for those who were non-English speaking or who were handicapped (physically, mentally, or emotionally) in such a way that they could not respond to the test.

STRATIFICATION VARIABLES. The four kinds of community (KOC) were defined as follows:

- Big Cities: communities designated as central cities according to the 1970 United States Census. Examples include Boston, Brockton, Haverhill, Holyoke, Lawrence, Worcester.
- Industrial Suburbs: suburbs of central cities with below-average family income (\$16,000) and with more than 20% commercial and 7% industrial land use. Examples include Cambridge, Chelsea, Medford, Quincy, Peabody, Waltham, Lee, Monson.
- Residential Suburbs: suburbs of central cities other than Boston with above-average family income, and all nonindustrial suburbs of Boston. Examples include Arlington, Braintree, Framingham, Scituate, Walpole, Andover, Dover, Milton, Newton, Chelmsford, Shrewsbury, Wilbraham.

- Other Communities: resort towns in the Cape Cod and Berkshire areas, nonindustrial suburbs of cities other than Boston with below-average family income, towns with below-average family income, and communities with a population of less than 2,500. Examples include Barnstable, Chatham, Yarmouth, Stockbridge, Bridgewater, Hadley, Oxford, Stoughton, Newburyport, Taunton, Ayer, Kingston, Orange, Webster, Ashfield, Dunstable, Plympton.

Test Administration

Collection of student and personnel data occurred during the three-week period of April 28 through May 16, 1980. A total of 1,498 sixth-graders and 1,022 twelfth-graders enrolled in 116 schools across the state participated. Testing sessions, which lasted approximately 60 minutes, were conducted by local teachers. The composition of the sample of participating students is presented below.

TABLE 1
Student Participation by Kind of Community

Reporting Category	Actual Sample Size			
	Grade 6		Grade 12	
	Number	Percentage	Number	Percentage
TOTAL	1,498	100%	1,022	100%
KIND OF COMMUNITY				
Big Cities	256	17%	216	21%
Industrial Suburbs	195	13%	68	7%
Residential Suburbs	572	38%	454	44%
Other Communities	475	32%	284	28%

The sample is, for the most part, representative of the actual composition of the population. Any disparities between the composition of the sample and the composition of the population were taken into account and corrected through the use of sampling weights. This statistical technique ensures that the results described in this report represent best estimates of the "true" achievement scores which would have been obtained had all Massachusetts students at the specified grade levels, rather than a representative sample, been tested.

Reporting the Results

Chapter II of this report describes the major outcomes of the nutrition assessment in Grades 6 and 12. For each grade level, achievement results are reported for all students for the items matched to each goal area and for all items on the total test. Chapters III to IV summarize the results of the student and personnel questionnaires. These results were presented to the NETP Technical Assistance Committee, the NETP State Advisory Council, and to regional and central office representatives of the Bureau of Nutrition Education and School Food Services. At an Interpretive Workshop, the Committee members analyzed and commented on the assessment results. Interpretations and recommendations made at this workshop are presented in Chapter V. These recommendations should prove interesting and valuable to those people--legislators, administrators, classroom teachers, food service personnel and laypersons--concerned with providing quality nutrition education.

It should be emphasized that the results included in this report indicate the average performance of Massachusetts students in Grades 6 and 12. No results for individual schools or school districts are included. Only local assessment could serve that purpose. More in-depth information about the methodology and outcomes of the assessment may be found in the Technical Report available at MDE.

CHAPTER II

ACHIEVEMENT RESULTS

Introduction

To describe the achievement of Massachusetts sixth- and twelfth-graders, the assessment results include performance scores on each test item, each goal area, and the total test. In this chapter, results by goal area and total test are described for each grade level.

The achievement scores represent best estimates of the "true" scores which would have been obtained had all students in the population at each grade level been tested. Statistical techniques indicate that these estimates are most likely within two percentage points of the "true" scores of the population. Small differences between scores should not be overemphasized.

Comparisons between grade levels on total test results or on goal area results should not be made because the set of test items administered at each grade level was not identical. About one-third of the items were repeated from Grade 6 to Grade 12, but the remainder of the items on each test were unique to the grade level. Test items at the twelfth-grade level were more difficult than those at the sixth-grade level. Except where noted in this report, comparisons of achievement between grade levels are not appropriate.

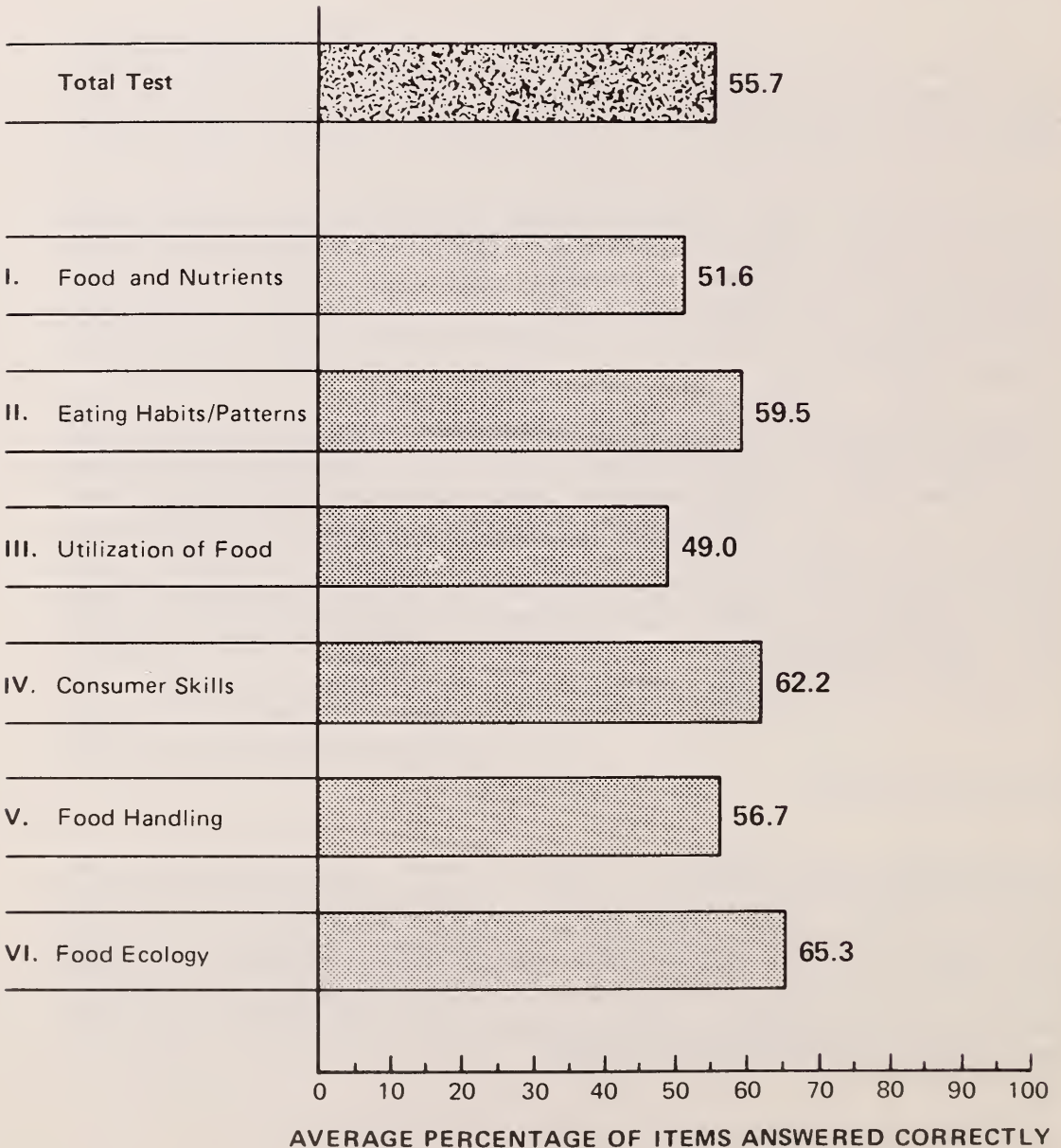
Summary of Results

ACHIEVEMENT IN GRADE 6. Figure 2 shows achievement by sixth-graders on the total test and on each of the six goal areas. Students in Grade 6 answered correctly an average of 55.7% of all test items. Across goal areas, scores of sixth-graders ranged between 49.0% and 65.3% correct. Their lowest performance was on Goals III, Utilization of Food, and I, Food and Nutrients. Their highest performance was on Goals VI, Food Ecology, and IV, Consumer Skills.

FIGURE 2

Achievement on Total Test and Goal Areas

GRADE 6

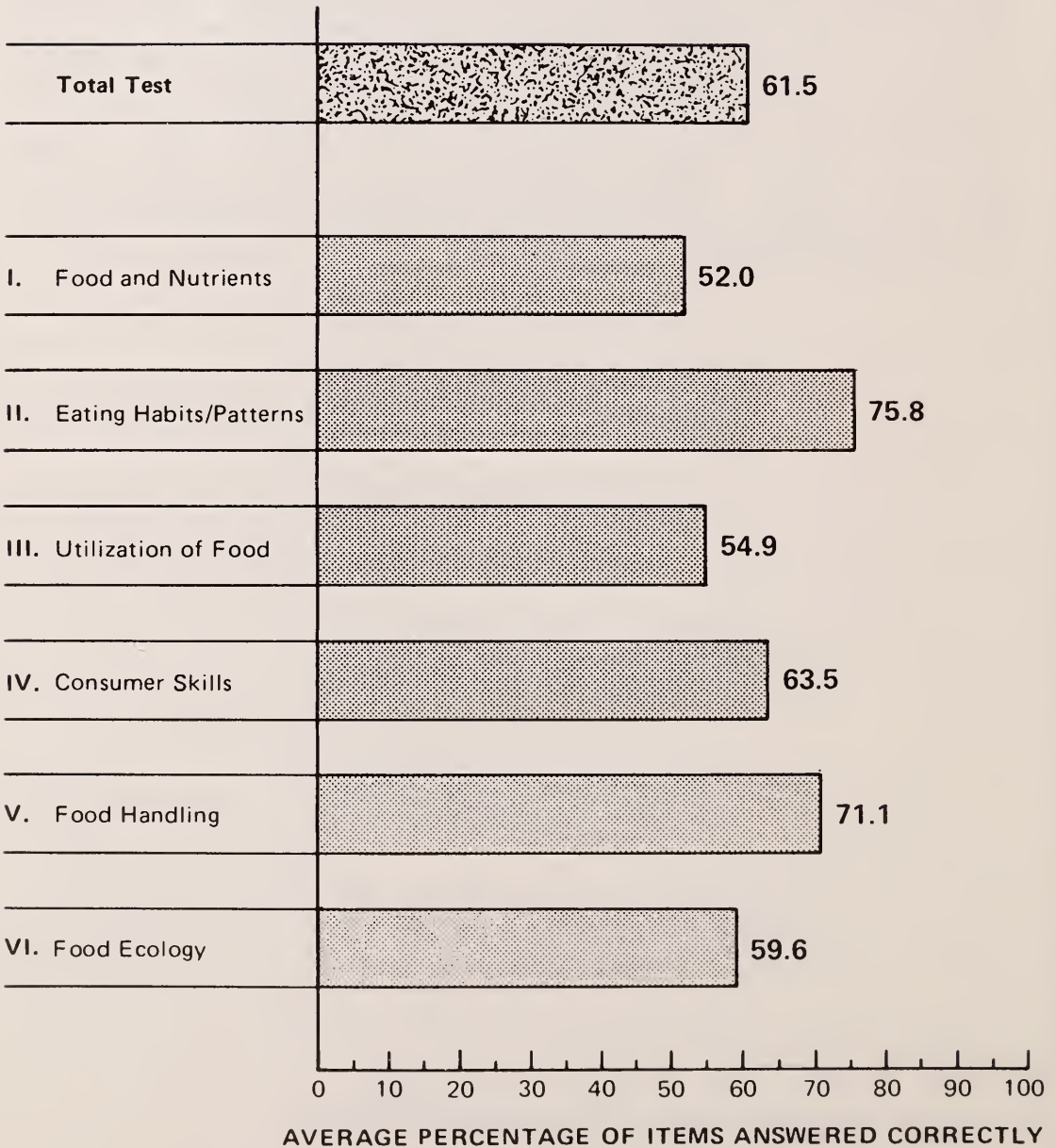


ACHIEVEMENT IN GRADE 12. Achievement by twelfth-graders on the total test and goal areas is shown in Figure 3. Massachusetts twelfth-graders answered an average of 61.5% of all test items correctly. Performance on the sets of items matched to each goal ranged from 52.0% to 75.8% correct. As in Grade 6, the lowest performance on the Grade 12 test was found in Goals I and III. The highest achievement scores were found in Goals V, Food Handling, and II, Eating Habits/Patterns.

GRADE-TO-GRADE COMPARISONS. For comparison purposes, 16 items were selected to be administered at both grade levels. Sixth-graders answered correctly 46.5% of these items while twelfth-graders answered correctly 65.3% of the repeated items. An increase in student performance from Grade 6 to Grade 12 was found on all but one item (13), on which twelfth-graders scored 24% correct, whereas sixth-graders scored 32% correct. Students were asked in that item to identify foods that are in the milk--milk equivalents grouping. On the remaining 15 items, the increase in performance from Grade 6 to 12 ranged from 10 to 37 percentage points.

FIGURE 3
Achievement on Total Test and Goal Areas

GRADE 12



CHAPTER III

COMPARING TOTAL TEST ACHIEVEMENT OF SELECTED GROUPS OF MASSACHUSETTS STUDENTS

Introduction

There are two ways in which student questionnaire results may be used. First, students can be grouped on the basis of their questionnaire responses, and the test achievement of the resulting "reporting groups" may then be compared (i.e., an "achievement analysis"). Second, an examination of the responses may, in itself, provide a policy-relevant characterization of students and student attitudes regarding nutrition education throughout the Commonwealth (i.e., a "survey analysis"). In this chapter, those student questionnaire variables which were found to bear a relationship to achievement are discussed. For each of these variables, both achievement and survey data are presented. In the next chapter, additional student questionnaire variables are discussed in terms of survey data only.

Interpretive Issues

The average percentage of test items answered correctly was computed for each student group. In each case, the average total test score for the group is compared to the average score for all students at that grade level within Massachusetts.

The narrative in this section will focus on those differences which were statistically significant. For the accompanying tables, these statistically significant differences are indicated by asterisks. In most cases, only those variables for which reporting groups performance differed by approximately two percentage points will be discussed in order to focus on differences of a magnitude that might prove to be educationally meaningful. However, the reader is reminded that statistical difference is not to be equated with educational meaningfulness. Small differences between groups may be statistically significant in one case and not in another due to a variety of factors. Even where statistically significant, differences may be too small to be educationally meaningful. What is educationally meaningful depends on the reader's judgment about the practical implications of given differences in scores.

In addition, these results should be interpreted in conjunction with the percentages of students selecting each response; a group score that is dramatically higher or lower than the state average may represent only a small percentage of students in the population. Further, the reader is cautioned to refrain from drawing cause-effect inferences from these data. The differences observed suggest only a relationship between a given factor and achievement, not a causative influence of the factor on achievement.

Summary of Results

A narrative summary of the achievement results is described below. The average performance for each of the selected reporting groups described below is presented in Table 4.

SEX OF STUDENT. At both grade levels, females outperformed males. However, differences in scores averaged only about two percentage points.

About as many girls as boys participated in the assessment activities at the sixth-grade level. In Grade 12, about 5% more females than males were tested; 53% of the participants were female while 48% were male.

STUDENT SOCIOECONOMIC STATUS. Based on student responses to questions about the type of work his/her parents do, a student socioeconomic status (SES) index was computed. Roughly, the criterion for SES classification is as follows.

- If at least one of the student's parents held a professional-type position, the student was assigned to the High SES group.
- If at least one parent performed skilled or office work, and neither parent was considered to hold a professional position, the student was assigned to the Medium SES group.
- If at least one parent held a semi-skilled or unskilled job, and neither parent's occupation was considered professional or skilled, the student was assigned to the Low SES group.

TABLE 4

Achievement by Student Questionnaire Reporting Groups

Reporting Group	Grade 6		Grade 12	
	Sample Size	Mean Score	Sample Size	Mean Score
ALL STUDENTS STATEWIDE	1498	55.7	1022	61.5
I am:				
female.	740	56.7*	537	62.9*
male.	755	54.7*	479	60.3*
Student socioeconomic status				
Low	208	51.9*	145	58.4*
Medium	552	54.8	300	60.3
High	664	58.7*	541	63.5*
Kind of community				
Big Cities	256	51.7*	216	57.0*
Industrial Suburbs	195	54.7	68	61.7
Residential Suburbs	572	58.8*	454	64.2*
Other Communities	475	55.5	284	60.4
I feel that I eat a nutritious, well-balanced diet.				
strongly agree	197	56.3	113	66.8*
agree	806	57.7*	515	61.8
undecided	361	52.8*	198	60.2
disagree	112	50.9*	177	59.0
strongly disagree	19	48.4	17	60.7

- NOTES: (1) "Sample Size" indicates the number of students in each reporting group.
- (2) "Mean Score" indicates the average percentage of test items on the total test answered correctly by students in the reporting group.
- (3) * indicates statistically significant difference between reporting group and statewide average.

TABLE 4 (cont.)

Reporting Group	Grade 6		Grade 12	
	Sample Size	Mean Score	Sample Size	Mean Score
ALL STUDENTS STATEWIDE	1498	55.7	1022	61.5
Do you usually eat breakfast on school days?				
yes	1268	56.4*	491	63.7*
no, because I don't have time	93	52.3*	313	60.1*
no, because I don't feel good in the morning	29	50.6	49	58.8
no, because I want to lose weight	19	54.8	36	64.7
no, for a reason not listed above	81	51.5*	130	56.8*
Have you ever gone on a diet to lose weight?				
yes	481	55.8	486	62.8*
no	958	55.7	521	60.4*
I'm not sure	52	56.8	12	63.1
Have you ever learned about nutrition in school?				
yes	1142	56.8*	802	62.9*
no	154	52.0*	161	56.7*
I'm not sure	196	52.5*	54	57.8
I have learned enough about food and nutrition in school to know whether or not I eat the right foods to stay healthy.				
strongly agree	374	56.9	115	64.4
agree	687	56.9*	472	62.1
undecided	223	54.0*	142	58.7*
disagree	169	52.8*	231	61.7
strongly disagree	41	47.4*	61	58.0

* indicates statistically significant difference between reporting group and statewide average.

For both grade levels, students who were classified as high SES outperformed the statewide average by 2% to 3% while those students whose parents' occupations placed them in the low SES group performed below the statewide average by at least three percentage points. Average performance of students belonging to the medium SES group tended to be about the same as the statewide average.

Only 14% of the students in each grade level were classified in the low SES group. More students (44% for Grade 6 and 54% for Grade 12) were assigned to the high SES category than to either of the other SES categories. Approximately 37% and 30% of the sixth- and twelfth-grade students, respectively, were included in the medium SES category.

KIND OF COMMUNITY. The performance scores of students in "Residential Suburbs" exceeded the statewide average by approximately 3% for both grade levels. In accordance with the findings of numerous previous assessments, performance of students who reside in "Big Cities" was lower than that of students statewide. At both the sixth- and twelfth-grade levels, scores of "Big City" residents averaged at least four percentage points below the state.

STUDENT DIETARY HABITS.

Student perception of diet: At the sixth-grade level, those students who indicated that they feel they eat a nutritious diet outscored the statewide average by 2%. By comparison, the achievement scores of students who were either "undecided" or "disagreed" that they eat a well-balanced diet averaged 3% to 5%, respectively, below the statewide average. However, students who either "strongly agreed" or "strongly disagreed" that they eat a well-balanced diet scored about the same as the state.

At the twelfth-grade level, with the exception of students who "strongly agreed" that they eat a nutritious diet, achievement by each student reporting group was about the same as the state. Performance of students who strongly agreed that they eat a nutritious diet averaged more than five percentage points above the statewide average. Approximately two-thirds of the students at each grade level "agreed" or "strongly agreed" that they eat a nutritious, well-balanced diet. The percentage of students in Grades 6 and 12 who indicated that they were undecided about their diets was 24% and 19%, respectively. Ten percent fewer students in Grade 6 (9%) than Grade 12 (19%) "disagreed" or "strongly disagreed" that their diets were well-balanced.

Breakfast patterns: At both grade levels, students who indicated that they usually eat breakfast on school days outperformed the statewide average by 1 to 2%. About 15% of the sixth-graders and 51% of the twelfth-graders admitted that they did not eat breakfast on school days. At the twelfth-grade level only, substantially more girls than boys (57% vs 44%) said that they did not eat breakfast.

The most common reason selected for not eating breakfast was a lack of time--6% of all sixth-graders and 30% of all twelfth-graders chose this response. (Thus, among only those students who do not eat breakfast, about 40% of the sixth-graders and 60% of the twelfth-graders claimed that they did not eat breakfast because they did not have enough time.)

Student dieting: For Grade 12, average scores of students responding "yes" to the question "Have you ever gone on a diet to lose weight?" were slightly higher than the statewide average (by 1%). By comparison, students selecting the "no" response to this question scored below the statewide average by approximately the same amount. No differences were found in achievement between these reporting groups and the statewide score at the sixth-grade level.

Sixteen percent more students at the twelfth-grade level (48%) than at the sixth-grade level (32%) indicated that they had dieted. In both grades, more girls than boys said that they have dieted (68% vs 26% in Grade 12 and 41% vs 24% in Grade 6).

STUDENT EDUCATION ABOUT NUTRITION.

Previous schooling in nutrition education: Students at both grade levels who responded "yes" to the question "Have you ever learned about nutrition in school?" scored slightly above the statewide average (by 1%), while students who responded "no" to this question averaged 4% to 5% below the statewide score at each grade level. About three-fourths of the students at each grade level indicated that they had learned about nutrition in school. Slightly more students in Grade 12 (17%) than in Grade 6 (10%) claimed that they had never learned about nutrition in school.

Attitude toward nutrition education: At the sixth-grade level, student achievement increased with positive agreement to the statement "I have learned enough about food and nutrition in school to know whether or not I eat the right foods to stay healthy." While students who agreed with this statement performed slightly better than the state (by 1%), students who were undecided, disagreed, or strongly disagreed scored below the statewide average by 2%, 3%, and 8%, respectively. At the twelfth-grade level, only scores of students who were undecided about this statement were different from the statewide average; these students averaged 3% below the statewide sample.

Forty-five percent of the students at both grade levels indicated that they felt that they knew enough about nutrition to stay healthy. Twenty-five percent of the students in Grade 6 compared to 11% of the students in Grade 12 strongly agreed that they have learned enough about nutrition; conversely, 24% of the students in Grade 12 compared to 11% of the students in Grade 6 disagreed with this statement. Approximately 15% of the students were undecided about this statement.

Summary Profile

In order to further summarize the information presented in this chapter, profiles of those student characteristics found to be related to achievement are presented below.

Students who tended to outperform the statewide average were those who:

- are female
- are of "high" socioeconomic status
- live in residential suburbs
- agree (Grade 6) or strongly agree (Grade 12) that they eat a nutritious, well-balanced diet
- usually eat breakfast on school days
- have dieted (Grade 12 only)
- say that they have learned about nutrition in school
- say that they know whether or not they eat the right foods to stay healthy (Grade 6 only)

CHAPTER IV

HIGHLIGHTS OF THE STUDENT AND PERSONNEL QUESTIONNAIRES

Introduction

The purpose of this chapter is to describe the results of the student and personnel questionnaires. An examination of the responses provides a policy-relevant characterization of students and school personnel, and their attitudes regarding nutrition education throughout the Commonwealth. Due to the limited scope of this report, it is only possible to present highlights of the findings.

Additional Highlights of the Student Questionnaire

DIETARY PRACTICES.

Frequency of eating the school lunch: Although the majority of students at both grade levels indicated that they usually eat the school lunch, this was true for slightly more sixth-graders (60%) than twelfth-graders (53%).

Frequency of eating dinner with the family: The majority of students at both grade levels also responded that they usually eat dinner with their families. However, this was true for more than 90% of the sixth-graders as compared to 79% of the twelfth-graders.

Frequency of taking vitamin pills: Approximately one-third of the students at both grade levels reported that they usually take vitamin pills. Again, slightly more sixth-graders (34%) than twelfth-graders (29%) responded affirmatively to this question.

Student participation in active exercise: While 78% of the sixth-graders reported that they take part in active exercise "every day" or "almost every day," only about half of the twelfth-graders responded in this manner. By comparison, more than twice as many students in Grade 12 (48%) as in Grade 6 (21%) reported that they take part in active exercise "a few days per week" or "seldom." Very few students (less than 2%) at either grade level indicated that they "never" participate in active exercise. At the sixth-grade level, there was only a 7% difference between the percentage of boys versus girls who said that they exercise daily or almost daily (81% vs 74%). There was a much larger difference (26%) at the twelfth-grade level (64% of the boys vs 38% of the girls said that they exercise this often).

NUTRITION EDUCATION.

Source of nutrition education: Students in Grade 12 were asked to indicate, for a list of subject areas, those courses in which they had been taught about nutrition. Subject areas in which the majority of students indicated that they had learned about nutrition were Science/Biology (73%), Health (72%), and Home Economics (63%). About one-third of the students reported learning about nutrition in Physical Education classes. Few students indicated that they learned about nutrition in Foreign Language, Social Studies, English, or Mathematics courses (11%, 10%, 4%, and 3%, respectively).

Student interest in nutrition education: When presented a list of seven nutrition-related topics (e.g., "vitamins and minerals," "eating habits") more students at both grade levels indicated an interest in learning more about all seven topics than indicated disinterest in these topics. However, students in Grade 12 registered a higher level of interest in six of the seven topics offered.

For Grade 6, student interest was highest in the topic "vitamins and minerals." Approximately two-thirds of the sixth-graders indicated that they would like to learn more about this topic. Strong student interest was also noted in the topics "relation of food to personal health," "eating habits," and "dieting, weight control, and appearance." Between 52% and 59% of the sixth-graders showed an interest in learning more about these topics.

At the twelfth-grade level, student interest in the listed topics was similar to student interests at the sixth-grade level. Student interest was highest in the area "relation of food to personal health;" 72% of the students indicated that they would like to learn more about this topic. Strong student interest was also shown for the topics "vitamins and minerals," "dieting, weight control, and appearance," and "eating habits." The percentage of twelfth-grade students indicating that they would like to learn more about these subjects ranged from 58% to 66%.

For both grade levels, student choices in topics of interest were lowest for "proteins, carbohydrates, and fats," "consumer information about food," and "world food problems." Student interest in these topics ranged from 43% to 52%.

Perceptions of general knowledge about nutrition: Most students reported they felt that in general, "people do not know enough about nutrition to make sure they get the right amount of food nutrients." However, slightly more students in Grade 12 (72%) than in Grade 6 (60%) indicated agreement with this statement. The percentage of students choosing the "undecided" response at the sixth- and twelfth-grade levels was 25% versus 16%, respectively. Fewer than 15% of the students at both grade levels reported that they "disagreed" or "strongly disagreed" with the above statement.

Highlights of the Personnel Questionnaire

INTRODUCTION. Personnel questionnaires were distributed to the following categories of adult personnel: principals, food service directors, school food service managers, food service workers, teachers, school nurses, and others. Table 5 shows the number and percentage of personnel in each category for the two grade levels.

It is not possible to include in this report a complete description of the responses by each of the seven personnel categories to each of the questionnaire items. A number of the questions were more appropriate to some personnel categories than to others, and there was a wide disparity of responses among the groups to some questionnaire items. For example, about 60% of the school food service directors and 15% of the school food service managers had taken a college-level nutrition course. The vast majority of both food service directors (88%) and managers (81%) had participated in in-service nutrition training in the past three years. On another question, more than nine out of ten principals said that their school offered students a nutrition course or activities related to learning about nutrition.

TABLE 5

Composition of the Sample for the Personnel Questionnaire

Personnel Category	Grade 6		Grade 12	
	Number of Respondents	Percentage of Respondents	Number of Respondents	Percentage of Respondents
Principal or other administrator	64	14%	52	14%
Food Service Director or Supervisor	27	6%	24	7%
School Food Service Manager	45	10%	29	8%
Cook/baker/other cafeteria staff	70	15%	59	16%
Teacher	179	39%	140	39%
Nurse	56	12%	43	12%
Other	18	4%	17	5%
TOTAL	459	100%	364	100%

Two questions illustrated that there is a need for increased communication between teachers and school food service managers. About four out of ten teachers, as compared to nine out of ten food service managers, agreed that the food service program at their school was very good. Furthermore, almost three times as many food service managers as teachers (62% vs 22%) agreed that "the food service personnel in their school cooperate with teachers in nutrition education activities."

ATTITUDES TOWARD NUTRITION EDUCATION: Personnel were asked to indicate their feelings about a number of statements pertaining to nutrition education. Most responding personnel (85% for Grade 6 and 88% for Grade 12) indicated that they agreed or strongly agreed with the statement "I think nutrition education SHOULD be an important part of the curriculum in my school." For both Grades 6 and 12, respondents also agreed (86% and 91%, respectively) that students who eat well-balanced diets tend to perform better academically. In addition, about three-fourths of the respondents at both grade levels disagreed or strongly disagreed with the statements "I feel that teaching nutrition should be left up to the parents, not the school" and "In school, teaching nutrition should be the sole responsibility of the home economics teachers." Furthermore, a similar percentage of the respondents indicated that they felt teachers and school food service personnel, as well as students, would be able to benefit from a nutrition education program.

When asked if local funds should be used to support nutrition education in their school, 63% of the Grade 12 personnel and 48% of the Grade 6 personnel agreed or strongly agreed. In addition, only about one-third of the personnel at each grade level indicated that they felt nutrition education is NOW an important part of the curriculum in their school.

PERSONNEL PERCEPTIONS OF STUDENT DIETARY PROBLEMS: Personnel were asked to indicate from a list of seven diet-related problems, those problems which were viewed as significant among students in their school. At both grade levels, about three-fourths of the personnel indicated that snacking on "empty calorie" foods was a significant problem. Although "skipping meals" was the second most popular concern, 19% more personnel at the Grade 12 level (63%) than at the Grade 6 level (44%) indicated that skipping meals is a significant problem. Of the remaining categories for Grade 12, approximately one-third of the personnel reported that "overweight/obesity," "fad diets for losing weight," and "excessive consumption of alcohol" were significant problems. At the Grade 6 level, about one-fourth of the personnel indicated that "dental problems" and "overweight/obesity" were of concern.

CHAPTER V

INTERPRETATIONS AND RECOMMENDATIONS

Introduction

This section of the report contains an analysis and interpretation of the findings of the nutrition assessment and a set of recommendations based on the findings. The work of interpreting the results was the responsibility of a Committee made up of members of the NETP Technical Assistance Committee, the NETP State Advisory Council, and representatives of the Bureau of Nutrition Education and School Food Services. The recommendations developed by the Committee are appropriate to several audiences including, but not limited to, local administrators, curriculum planners, teachers, food service personnel, and state-level decision-makers.

The Context: The Committee's View of the Findings

The findings were viewed by the Committee as constituting baseline information about the basic nutrition knowledge of Massachusetts students at the end of the sixth- and twelfth-grade school years. The Committee made interpretive comments on performance across goals at each grade level which fell short of expectations and which met or exceeded expectations. While most recommendations are based on perceptions of weaknesses in student skills, the committee emphasized that strengths should not be overlooked. Areas which showed high performance by students should continue to receive the same curricular and instructional effort in order to maintain these strengths.

Interpretations and Recommendations: Grade 6

GOAL I: FOOD AND NUTRIENTS. The performance of Massachusetts sixth-graders was second lowest on this goal area (51.6%) which required students to demonstrate an awareness of the sources and functions of foods and nutrients. Student performance on the items (1-20) included in this goal area was the primary source of Committee dissatisfaction.

As the Committee had expected, student performance on this goal area was highest for Items 1-4, which required students to identify sources of foods. Scores for these items ranged from 80% to 99% correct. The Committee suggested that above average student performance (80% correct) on Item 4, which required students to know that raisins are made from grapes, reflected the influence of television cereal commercials. In general, it was the Committee's opinion that "where food comes from" is a topic adequately stressed in the curriculum. The Committee also remarked that the average score for Goal I was inflated by student performance on these four items and therefore does not accurately reflect the problems encountered by students in this goal area.

The Committee felt that students do not understand the concept of calories. When asked to define a calorie (Item 5), fewer than half of the students (43%) correctly identified "calorie" as "amount of energy." On the other hand, 89% of the students were able to correctly identify skim milk, rather than chocolate milk, strawberry milkshake, or whole milk, as having the fewest calories (Item 6). Committee members again commented that advertising may have influenced students' responses to this item.

Student performance was considered especially poor on the items requiring students to distinguish between food groupings and/or foods within each grouping. Students' scores for Items 13 and 14, which were associated with food groupings, were 32% and 28% correct, respectively. It was the Committee's opinion that food groupings are probably being taught in terms of categories, which students learn by rote memorization, rather than in terms of nutrient equivalents. For instance, on Item 14 students appeared to be confused when asked to identify the food grouping which included peanut butter. About 41% of the students incorrectly chose the "breads-cereals" grouping whereas only 28% correctly chose the "meat equivalents" grouping.

Students were also found to have difficulty with those items which required them to identify sources of nutrients (e.g., carbohydrates, proteins, fats, vitamins, minerals). For six of the eight items measuring this area, student scores ranged from 17% to 33% correct. For example, only 17% of the students correctly answered that rice and beans would supply the most complete protein (Item 8) and only 18% of the students knew that baked beans were a source of carbohydrates (Item 9). Only thirty-three percent of the students correctly identified cream as a source of animal fat, while 44% of the students incorrectly identified corn oil (Item 18).

Carbohydrates appeared to be the most misunderstood of all the nutrients. Students' scores of 18% and 28% correct for Items 9 and 10, respectively, were among the four lowest for this goal area. The Committee felt that students showed little understanding of carbohydrates and confused this nutrient with fats. This was particularly evident in Item 10, for which 44% of the students incorrectly identified the two types of carbohydrates as "fats and oils" while only 28% chose the correct response "starches and sugars." An understanding of carbohydrates and fats is particularly important in view of the dietary guidelines which call for an increase in the consumption of starches and fiber and a decrease in the consumption of fat.

The Committee felt that there was also a need for student improvement in matching nutrients with their functions. Student scores for these items (11, 12, 15, 16) ranged from 31% to 62% correct. For example, less than half of the students (48%) knew that calcium and phosphorus work together in the body to build bones (Item 16). It is interesting to note that, according to their responses on the student questionnaire, sixth-graders' interest was highest in the topic "vitamins and minerals."

RECOMMENDATIONS

- Educators should be trained to teach foods and nutrients in terms of nutrient equivalent foods rather than food groupings, and to include recent modifications outlined in the 1980 U.S. Dietary Guidelines.
- It is recommended that the concept of "nutrient equivalent foods" be incorporated into social studies units in terms of food alternates consumed by people around the world.
- Nutrition educators should be made aware of students' confusion concerning "calories," "carbohydrates," and "fats;" nutrition education should include more detailed units to clarify and promote a better understanding of these terms.
- It is recommended that "functions of nutrients" be covered in science units in more detail.

GOAL II: EATING HABITS/PATTERNS. Students answered correctly an average of 59.5% of the 10 items (29-38) for this goal area, which dealt with understanding factors which influence eating, the effects of eating habits, and the importance of a balanced diet. The percentage of items in this goal area answered correctly by students ranged from 28% to 90%.

In general, the Committee again recognized the pervasive influence of media on the responses of students to the items included in Goal II. Committee members were also concerned that students may be choosing foods on the basis of repeated exposure to advertisements or through rote memorization of food categories. The Committee felt that students may not understand the actual nutritional value of foods. For example, when asked to identify "yogurt" (from a list also including "macaroni," "eggs," and "carrots") as a food that would provide the same nutrients as milk (Item 33), 73% of the students selected the correct answer, but only 32% could identify a list of foods that belonged in the milk--milk equivalents grouping (Item 13 in Goal I). Student performance on Item 29 (59% correct), which required students to know that women need more iron than men, also suggested to the Committee that students were influenced by commercials, since, in Goal I, students exhibited difficulty in identifying a source of iron (Item 20).

In Item 32, students were asked to identify the "best way to make sure that your body gets all the nutrients it needs." Committee members were particularly interested in this item not because of the 64% of the students who correctly answered "eat a variety of foods," but because of the 27% who incorrectly selected the alternative "take vitamin pills," and the 34% who use vitamin pills daily. Concern was expressed regarding the extensive advertising and promotion of vitamin pills as a basic "cure-all" and substitute for foods as a nutrient source. The Committee felt that this advertising results in serious misconceptions about the nature of vitamin pills and the nutritional value of highly fortified foods.

Based on the above results, it appears that students are not totally lacking in a basic knowledge of the factors related to eating habits, but that they do not possess the basic understanding of foods and nutrients which would allow them to apply this knowledge in everyday situations (such as selecting nutrient equivalent foods).

RECOMMENDATION

- In consumer education units, more emphasis should be placed upon the influence of advertising on the selection of foods.

GOAL III: UTILIZATION OF FOOD. Student performance was lowest (averaging 49% correct) for the items matched to this goal area. However, Committee members were not disappointed in student performance on the four items (45, 46, 49, and 50) included in this goal area.

The Committee attributed the low level of achievement (28%) on Item 45 to the advanced vocabulary employed. Students were required to recognize that "metabolism," not "elimination," "respiration," or "circulation," is the process for changing food to energy. Committee members suggested that this concept may not be appropriate for the sixth-grade level.

Student scores for the remaining items in this goal area (46, 49, and 50) were much higher than the Committee had expected (49%, 70%, and 49%) for items concerning the elements and processes involved in the body's utilization of food.

Committee members felt that many students had performed well in this goal area because they had studied digestion and other body processes in elementary science curricula. Student knowledge about nutrition appeared to be greatest (in relation to expected levels of achievement) for material which was thought to be receiving specific coverage in regular curriculum units such as health, science, and social studies. The Committee wanted to encourage educators of these subject areas to continue their attention to nutrition in the course of the curriculum.

RECOMMENDATION

- Continued support of and attention to nutrition topics in the regular curriculum (e.g., in health, science, and social studies units) should be encouraged.

GOAL IV: CONSUMER SKILLS. Average goal achievement of sixth-graders was second highest on this goal. Student performance on the four items matched to this goal area averaged 62.2% correct. Students performed above the Committee's expectations.

About half the students correctly answered Item 44, which required students to know that the amount of food in different food packages can best be compared by looking at the "number and size of servings" (as opposed to "food additives," "last dates of sale," and "lists of ingredients"). About the same percentage answered Item 43 correctly, which required students to demonstrate comparison shopper skills involving unit pricing.

Student performance was higher for the two items (47, 48) requiring students to analyze information provided on food labels (72% and 79%, respectively). Committee members suggested that students demonstrated a real understanding of label information in Item 47, despite the advanced vocabulary level, which required students to know that the information on a food label most important for a person who cannot eat sugar is the "ingredients" (rather than "caloric content," "price," or "nutritional requirements").

In general, the Committee felt that student performance in this goal area was high for sixth-graders. Committee members would like to encourage those responsible for the present level of consumer skills exhibited by sixth-graders to continue to provide the same quality of education in this area.

RECOMMENDATIONS

- Those educators responsible for consumer education units now being taught should be encouraged to continue their efforts in this area.
- Consumer education included in social studies units should be maintained.

GOAL V: FOOD HANDLING. Student achievement was about average (56.7% correct) for the eight items matched to this goal area. These items covered methods of preserving, storing, preparing, and distributing food at the industrial as well as household level. Although the sixth-graders performed well in this goal area, this level of student achievement was expected. Committee members noticed that students appeared more familiar with the food processing methods related to industry than the home, but remarked that sixth-grade students may not need additional information or experience concerning home food preparation.

Students scored between 51% and 70% correct on the four items concerning industrial food processing. The Committee attributed the high level of performance to television advertising (e.g., Item 23, "Preservatives" are added to most bakery goods to keep them fresh) and to consumer education units (Item 22, foods from faraway places are usually more expensive because of the "cost of shipping"). However, the Committee was concerned about student performance on Item 21 (51% correct) requiring students to know that pasteurization is the method used to make milk safe. Thirty-eight percent of the students incorrectly identified "homogenization" as the proper method. Committee members felt that this misunderstanding could also be due to television advertising, but stressed that this was an important concept for students to understand.

For the four items (25-28) matched to this goal pertaining to food preparation in the home, student scores ranged from 32% to 72% correct. The Committee was surprised that 49% of the students were able to correctly identify "chicken salad" (versus "margarine," "jello," or "tomato sauce") as the food most likely to cause food poisoning if not refrigerated (Item 27). It was clear to the Committee that students knew cooking oil was necessary for deep-frying, since 72% of the students correctly answered Item 26, and Committee members attributed student achievement here to the fast-food orientation of our society.

The Committee recognized that students did not need special remediation in this area, but again stressed that present education levels should be maintained.

GOAL VI: FOOD ECOLOGY. The average goal performance of Massachusetts sixth-graders was highest for this goal area. The Committee was very pleased with student performance on these four items (39-42). Committee members were impressed that on the two items requiring students to demonstrate an understanding of food problems on an international (Item 38) and national (Item 40) level, 67% and 72% of the students, respectively, answered these items correctly.

The Committee noted the results for the two items pertaining to national food programs with interest. Student performance of 72% correct on Item 40, which required that students identify the main purpose of the school lunch program, was consistent with performance on the items matched to this goal previously mentioned. However, only about half of the sixth-graders could correctly identify that the purpose of the U.S. Food Stamp Program is to help eligible people buy more nutritious foods. Because 25% of the students incorrectly chose the response which identified the purpose of the food stamp program as encouraging Americans to use store coupons to save money, the Committee interpreted these results as an indication of the public's misunderstanding of the food stamp program.

Once again, the Committee attributed the high performance scores in this goal area to the inclusion of subject matter related to this goal area in current social studies curricula. The Committee was pleased at this integration of nutrition information with social studies materials and emphasized that social studies teachers should be encouraged to maintain this high level of education.

RECOMMENDATION

- Social studies educators should continue to incorporate nutrition topics related to national and world food problems and programs in their curricula.

Interpretations and Recommendations: Grade 12

GOAL I: FOOD AND NUTRIENTS. Massachusetts twelfth-graders answered an average of 52.0% of the 20 items matched to this goal correctly. Performance on this goal was the lowest of all six goal areas tested. Scores on individual items ranged from a low of 24% to a high of 84% correct. In general, the Committee felt that student responses pointed out a number of common misconceptions and illustrated the need for continued education in a number of nutrition concepts.

Four items in this goal measured knowledge about carbohydrates. Student performance was relatively high on two of the items. About seven out of ten students knew that an important function of carbohydrates is to supply the body with energy (Item 12). Almost the same proportion (65%) correctly identified the two types of carbohydrates as "starches and sugars" (Item 10). However, nineteen percent of the students chose the alternative "fats and oils" for this item. Fewer than half (46%) knew that carbohydrates (rather than fats, vitamins, or proteins) are converted to energy most quickly (Item 2). In addition, on Item 9, only 30% knew that baked beans were a better source of carbohydrates than ham, fish, or corn oil. This low performance revealed a severe lack of knowledge about carbohydrates, inasmuch as the three incorrect alternatives contain no carbohydrates at all.

Other items in this goal area dealt with the sources and functions of proteins, fats, vitamins, minerals, and water, with the use of nutrients by the body, with the caloric content of different foods and with food equivalency. While the Committee made interpretive comments on almost every test item, only a representative sampling of comments will be included here.

Many students seem unaware of the difference between vitamins and nutrients. Only about one-third of the twelfth-graders knew that "enriched" foods contain "nutrients which replace those lost during refining" (Item 3). More than half of the students thought that enriched foods contain more carbohydrates than other foods or more vitamins than the original food.

Only 38% of the students knew that rice and beans contained more complete protein than peas and carrots, orange juice and pancakes, or bread and jelly (Item 8). However, 84% of the students knew that one of the major functions of protein is to build and repair muscles (Item 11).

Performance on items dealing with fats (Items 17 and 18) may have been enhanced by persistent television advertising--68% of the students knew that butter contained more saturated fat than safflower oil, spinach, or potato, while 76% knew that polyunsaturated fats are thought to be less harmful to the heart and circulatory system than saturated fats, unsaturated fats, or cholesterol.

There was concern with the performance level for the two items in this goal which had to do with food groupings and equivalency. On Item 14, only 43% correctly chose "meats--meat equivalents" as the proper food grouping for peanut butter. The poorest performance was on Item 13, which required students to identify foods included in the "milk--milk equivalents" grouping. Only 24% chose the correct answer ("ice cream, cheddar cheese, and yogurt"), while 72% chose "milk, cream cheese, butter." This level of performance was even lower for Grade 12 students than for Grade 6 students. This was a further illustration that students consistently mistake conceptual food groupings (e.g., "dairy products") for groupings based on nutrient equivalency. Some textbooks still in use unfortunately perpetuate this misunderstanding.

RECOMMENDATIONS

- "Basic nutrition vocabulary" should be taught so that all graduating students will understand such terms as "nutrient," "calorie," and "carbohydrate," which are used extensively in labeling and advertising.
- Basic nutrition principles should be emphasized and reinforced by integration into all subject areas.
- Teachers should relate the concepts of food and nutrients to day-to-day food consumption. Students should be taught the practical significance of learning about nutrition.

GOAL II: EATING HABITS AND PATTERNS. About 75.8% of the ten items matched to this goal were answered correctly. This level of performance was the highest of the six goal areas on the twelfth-grade test. Individual item scores ranged from 32% to 90% correct.

Seventy-eight percent of the students knew that "eating a variety of foods" was a better way than "eating enriched bread," "drinking lots of liquids," or "taking vitamin pills" to make sure that "your body gets all the nutrients it needs" (Item 32). About three out of four students knew that a woman would need more of all nutrients when she becomes pregnant (Item 30).

About 88% knew that eating just one type of food as a means of dieting does not supply all the essential nutrients (Item 37). Furthermore, 87% knew that a balanced diet with low caloric content was the safest diet for losing weight (Item 38).

The high performance (90% correct) on Item 29 was attributed to the widespread influence of advertising. This question required students to know that women need more iron (rather than more sodium, calcium, or niacin) than men.

While 80% of the students knew that hard cheese would provide most of the same nutrients as milk (Item 34), only about one-third knew that baked beans could balance a meatless diet better than brown rice, yellow squash, or wheat bread (Item 33). This reinforces the need for increased instruction of the food equivalency concept.

GOAL III: UTILIZATION OF FOOD. Grade 12 students answered correctly an average of 54.9% of the four items matched to this goal. Individual item scores were very close to each other, ranging from 50% to 57% correct.

Because of the highly technical nature of the items matched to this goal, student performance was felt to be generally satisfactory. All of the items, in the opinion of the Committee, could be answered correctly by students who had completed a health or biology course. They felt however, that many adults would be unable to answer these questions correctly. In this goal, students were required to know that: most nutrients are absorbed into the bloodstream in the small intestine (Item 43); the digestive process begins in the mouth (Item 44); the liver manufactures bile (Item 45); and that the sum of all chemical and physical processes that are continually occurring in the body is called "metabolism" (Item 46). At both grade levels, there was a more than 10 percentage point difference between the scores of low and high socioeconomic status students on Goals III and IV.

GOAL IV: CONSUMER SKILLS. Massachusetts twelfth-graders scored an average of 63.5% correct for the four items matched to this goal. Scores on the individual items ranged from a low of 48% to a high of 81% correct.

While the Committee was pleased that 81% of the students knew that, when comparing similar products, brand names were a less important factor to consider than nutritional information, serving size, or ingredients (Item 41), Committee members were disappointed in student performance on the remaining items in this goal area. They felt that students exhibited poor reading skills when they were asked to read and understand a food label (69% correct, Item 48). Committee members also expressed concern that fewer than half of the twelfth-graders (48%) knew that on a food package, ingredients must be listed in order according to the amount of each ingredient (Item 47).

The Committee was very concerned with the performance of students on Item 42, which involved the comparison of four unit price labels. Students were required to identify the label which indicated the "best buy per unit," assuming the contents of each are equivalent. Committee members felt that it should have been easy for students to note the lowest "price per pound" of the four labels, but only 55% of the students answered this item correctly. The Committee pointed out that this item represented one of the most practical applications of knowledge for everyday use, and therefore felt that students need additional practice in using unit pricing labels.

Committee members felt that the importance of good consumer skills should be stressed to both students and teachers. Before leaving high school, students should have acquired the skills that will allow them to purchase foods wisely. Committee members were concerned that so many of the students seem ill-prepared.

RECOMMENDATION

Students should be given practice in applying consumer skills; special attention should be given to the proper use of consumer information on product labels and unit price labels. These skills may be taught in any of a number of subject areas--reading, mathematics, nutrition, social studies, etc.

GOAL V: FOOD HANDLING. Performance on this goal was relatively high. Students answered an average of 71.1% of the eight items correctly. Scores for individual items were between 39% and 90%.

Items in this goal dealt with food processing, preservation, and preparation. Satisfaction was expressed regarding the level of achievement on such items as the definition of the words "preservative" (Item 23--84% correct) and "fortified" (Item 24--90% correct). Half of the students (52%) knew that meat inspection by the Federal government is not required for meats cut and sold in local grocery stores (Item 21). However, only 39% of the students knew that, in the canning process, heating food to a high temperature is necessary to inactivate enzymes and kill microorganisms (Item 28). More than half of the students thought that "sealing the food in an airtight container" was sufficient to kill the microorganisms. With the upsurge of home canning, students should be made aware of the necessary steps to insure the proper preservation of foods. Committee members were encouraged that 83% of the students recognized "cooking with little salt and fat" (Item 26) was the best method of food preparation for a person with a family history of heart disease and high blood pressure.

GOAL VI: FOOD ECOLOGY. The average score was 59.6% for the four Goal VI items. Scores ranged from 49% to 70% correct.

Given the particular questions asked, the level of performance was considered acceptable. Committee members were pleased that 70% of the students knew that the government food stamp program was established to "help eligible persons buy more nutritious foods on limited incomes" (Item 49). They were also satisfied that 54% of the students recognized the main purpose of a school lunch program is to provide "about one-third of the daily nutritional requirements for students" (Item 50).

Concluding Interpretations and Recommendations for Grades 6 and 12

The Committee wished to emphasize that the influence of television and, in particular, of commercials for food and vitamin products, should be recognized. The mass media can be an effective tool for the dissemination of nutrition information, as well as a starting point for class discussions of specific nutrition concepts.

Teachers should take advantage of the many resource materials available which present nutrition information in an attractive effective manner. The Department of Education and the Bureau of Nutrition Education and School Food Services should continue to make every effort to disseminate these materials.

Committee members wished to point out that, while these assessment results indicate room for improvement, Massachusetts students and teachers can take pride in student performance in many areas. For example, the Committee was pleased with the performance of sixth-graders in items measuring food ecology and consumer skills, and with the achievement of twelfth-graders in items related to health, and to eating habits and patterns.

Finally, the Committee reiterated the need to help students translate their knowledge of nutrition concepts into practical application. This implementation is essential to improve their physical, emotional, and intellectual well-being and to become healthy, "nutrition-wise" adults and parents.

In summary, the Committee proposed the following general recommendations regarding nutrition programs in the Commonwealth.

RECOMMENDATIONS

- More instruction in nutrition should be provided at all grade levels. Lack of knowledge about nutrition concepts, especially in regard to nutrient equivalent foods, was found to be common at both Grades 6 and 12. In addition, a majority of students reported that they were interested in learning more about most of the major topic areas in nutrition.
- Teachers should be provided with more preparation for the teaching of nutrition. Suggestions for increased preparation are:
 1. Continuing education opportunities such as the availability of in-service training and local college courses.
 2. Preservice course requirements for elementary teachers and secondary teachers in allied fields (science, health, physical education, home economics).
- The school cafeteria should be used as a learning laboratory. Responsibility for the learning experiences provided in this setting should be shared by school administrators, educators, and food service personnel.
- More interdepartmental coordination of nutrition is warranted to ensure adequate coverage of all important nutrition topics.
- The Committee would like to see a greater interest and involvement in nutrition education by men, especially at the administrative level. Visibility for nutrition as a basic skill should be provided.
- The results of the present assessment should be used as baseline information against which comparisons of future assessments should be made. More specifically, many or all of the items from the present assessment should be incorporated in a test instrument and administered in the 1982-83 school year. Furthermore, "target scores" should be established for each grade to indicate acceptable levels of performance.

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